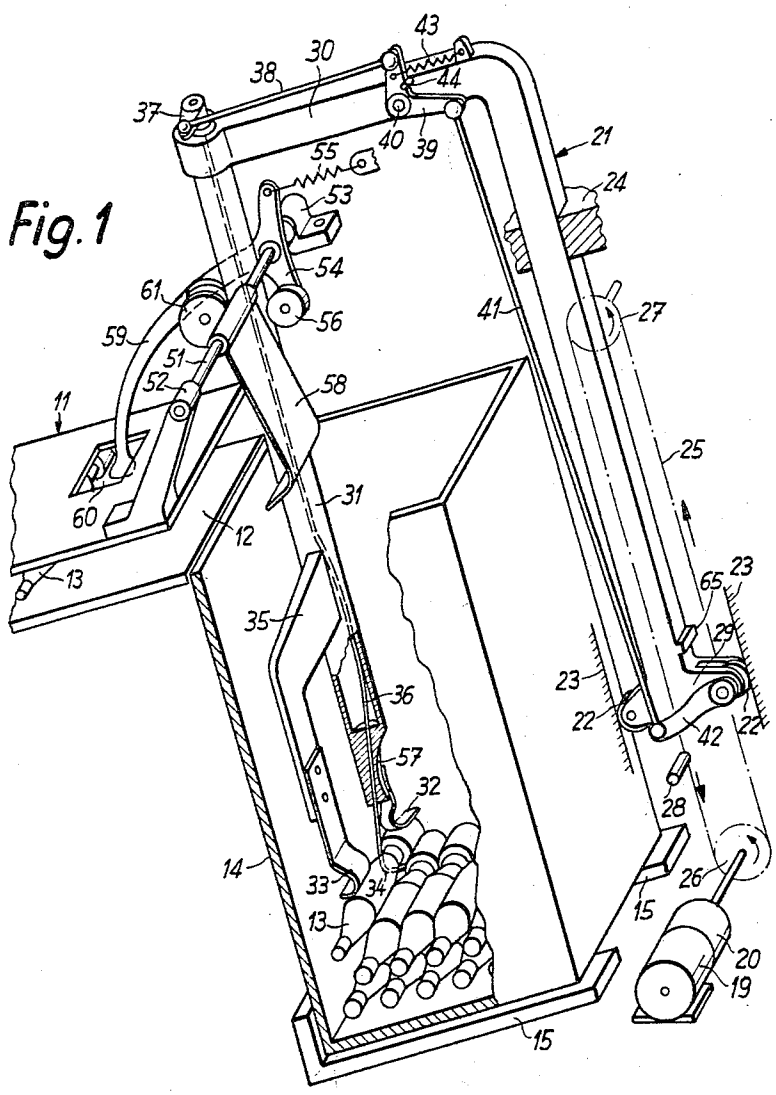
Feb. 25, 1964 F. LUTZ ETAL 3,122,268

MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM

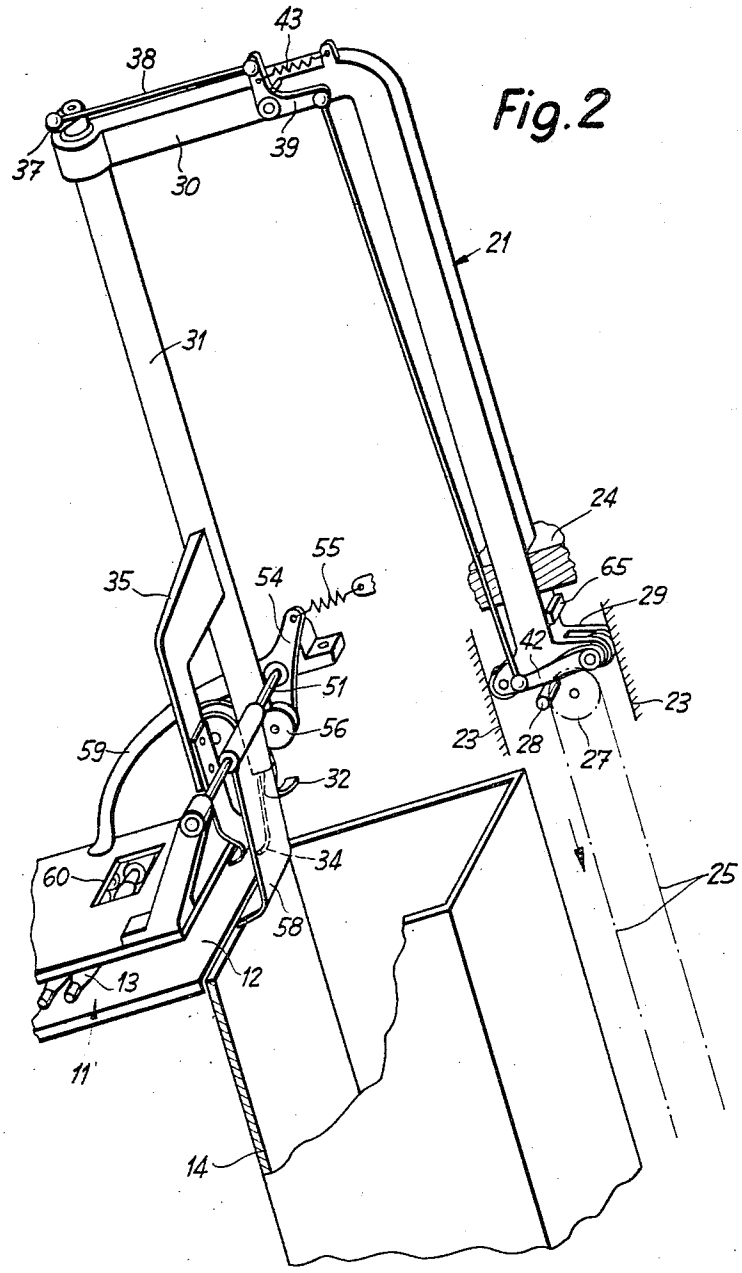
Filed April 12, 1960 5 Sheets-Sheet 1

Fig. 1



Feb. 25, 1964 F. LUTZ ETAL 3,122,268
MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM
Filed April 12, 1960 5 Sheets-Sheet 2

Fig. 2



Feb. 25, 1964 F. LUTZ ETAL 3,122,268
MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM
Filed April 12, 1960 5 Sheets-Sheet 3

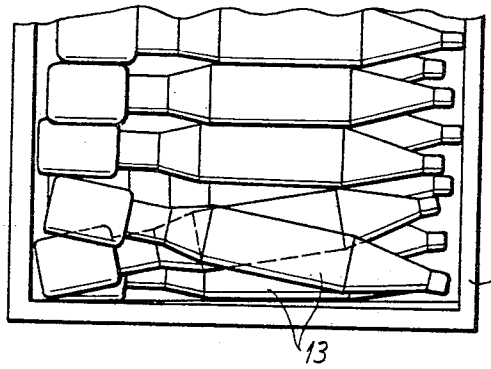


Fig.3

Fig.5

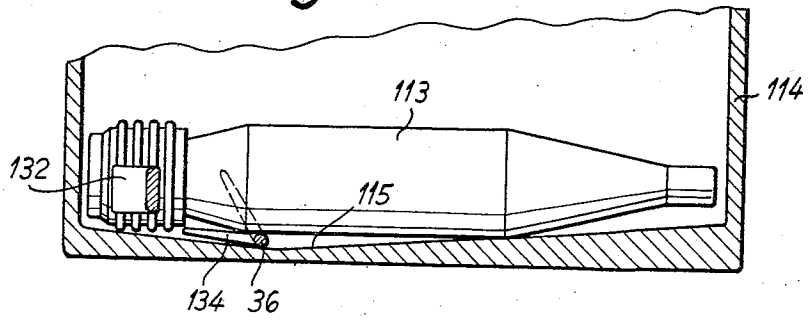


Fig.9

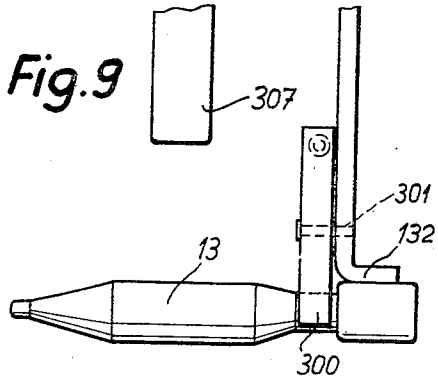
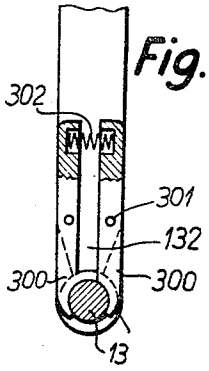


Fig.10

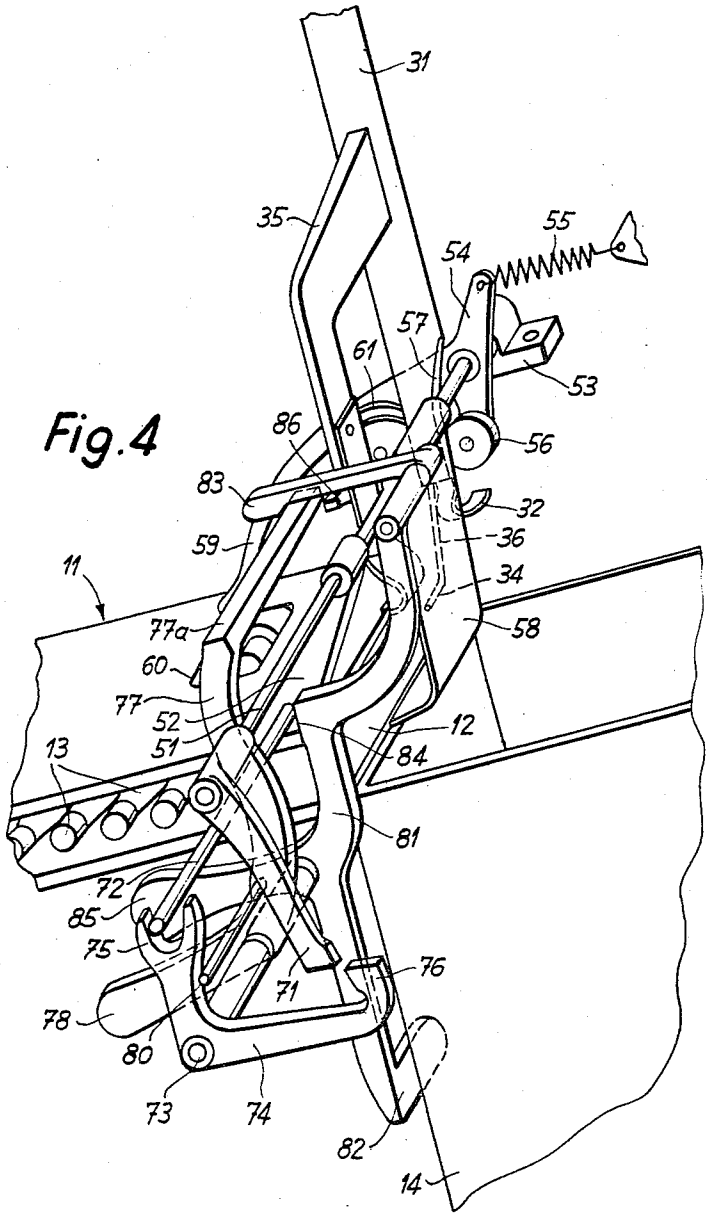


Feb. 25, 1964 F. LUTZ ETAL 3,122,268

MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM

Filed April 12, 1960 5 Sheets-Sheet 4

Fig.4



Feb. 25, 1964 F. LUTZ ETAL 3,122,268
MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM
Filed April 12, 1960 5 Sheets-Sheet 5

Fig. 6

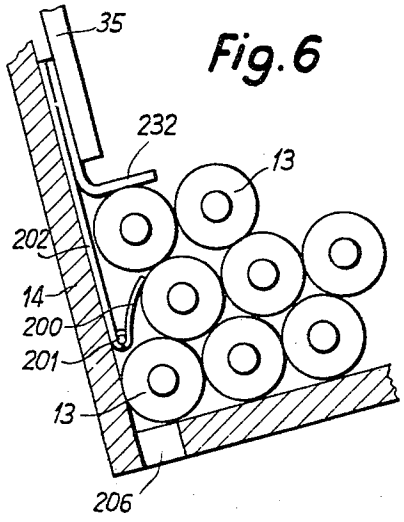


Fig. 8

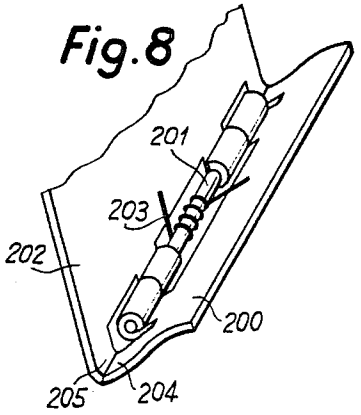


Fig. 7

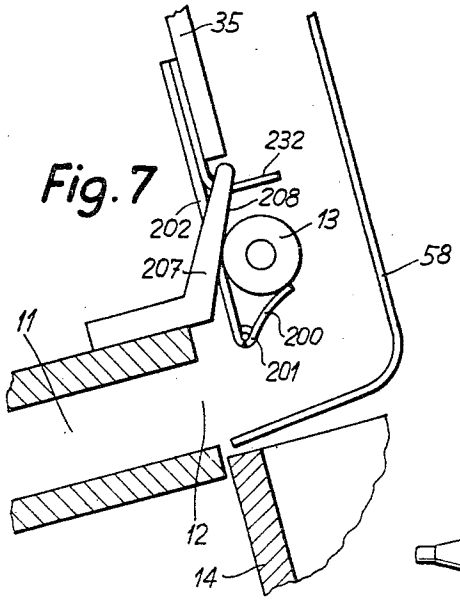
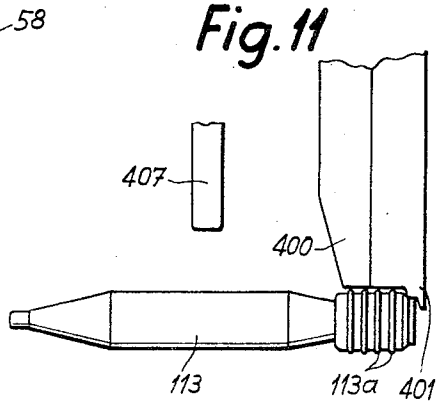


Fig. 11



United States Patent Office 3,122,268 Patented Feb. 25, 1964

3,122,268

MECHANISM FOR FEEDING THE WEFT-BOBBINS TO THE AUTOMATIC BOBBIN-CHANGE OF A MECHANICAL LOOM

Friedrich Lutz, Durnten, and Peter Stucki and Hermann Merki, Ruti, Switzerland, assignors to Ruti Machinery Works Ltd., formerly Caspar Honegger, Ruti, Zurich, Switzerland

Filed Apr. 12, 1960, Ser. No. 21,625
Claims priority, application Switzerland June 29, 1959
6 Claims. (Cl. 221—13)

This invention relates to a mechanism for feeding the weft-bobbins to the automatic bobbin-change mechanism of a mechanical loom from magazines, in which the bobbins lie loosely over each other in several layers without partition walls. The magazines, while being emptied, are inclined on the loom in such a way that the bobbins tend to roll by gravity towards the lower end of the magazine.

In known mechanisms of this type, emptying of the magazines from their lower end occurs downwardly by gravity through an aperture or discharge opening which is only large enough to permit the passage of a single bobbin or yarn package each time. But actual practice has shown that the bobbins in known devices do not always come out of the magazine in the desired way, since very frequently the yarn packages or bobbins bridge over the outlet opening, and some bobbins hinder the discharge of other bobbins or yarn packages. In order to remedy this inconvenience, means have been used for shaking the magazine being emptied or for loosening the bobbins that bridge the discharge opening. In such known apparatus the bobbins, particularly if wound with fine yarns, may become damaged so as to impair the quality of the fabric to be made therefrom.

The present invention has for its object to obviate all the above described drawbacks. An underlying principle of the invention is to take the bobbins from the magazines not downwardly but upwardly from the magazine situated on the automatic bobbin-change. Accordingly apparatus according to the invention is principally characterized by an upwardly and downwardly movable gripper with a path of movement extending into the magazine and directed to the lower end thereof, together with a drive for moving the gripper to take hold of and lift at least one bobbin or filled yarn package each time and to transfer the same into the inlet opening of a spool or bobbin channel of the automatic bobbin-change. Preferably, the gripper is guided by means of a slide fitted with at least one foot which, by resting on the topmost bobbin lying in the path of movement, defines the downward movement of the gripper which takes place under the influence of gravity, or under control of a spring or of a motor-driven slip-coupling.

Other features of the invention will appear from the following descriptions and claims, taken in conjunction with the accompanying drawing, wherein there are shown purely by way of example and diagrammatically some possible forms of embodiment of the invention.

FIG. 1 is a fragmentary perspective view having a vertical cut-away section of a portion of a bobbin channel of an automatic bobbin-change, and illustrates a bobbin magazine in emptying position and apparatus for automatically transferring the bobbins from the magazine into the bobbin channel according to the invention;

FIG. 2 is an enlarged fragmentary perspective view of the mechanism in FIG. 1 at another moment in the cycle of operations;

FIG. 3 is a fragmentary plan view of a magazine illustrating how some of the bobbins lie irregularly therein;

FIG. 4 is a fragmentary perspective view of a second form of embodiment of the invention;

FIG. 5 is a fragmentary plan view partly in section of a bobbin magazine illustrating a bobbin located therein, and parts of a modified gripper mechanism for lifting the bobbins according to the invention;

FIGS. 6 and 7 are side views partly in vertical section illustrating another embodiment of the gripper mechanism according to the invention at different moments in the cycle of operation;

FIG. 8 is a perspective view of a detail of the embodiment in FIG. 7;

FIGS. 9 and 10 are fragmentary views of still another embodiment of gripper mechanism according to the invention; and

FIG. 11 is a fragmentary view of another modification of the mechanism.

Referring more particularly to FIGS. 1 and 2, a bobbin channel 11, inclined to the horizontal, has an inlet opening 12 for yarn packages for example the weft-bobbins 13 which are brought to the loom from a winder by means of magazines or containers 14. Of the magazines 14 only one is shown. In the form illustrated the magazines 14 has the shape of a parrallelepiped box open at top, in which the bobbins lie loosely disposed over each other in several layers without intervening partition walls. In the emptying position shown, the magazine 14 rests on supports 15 in such a way that its walls and bottom are inclined to the horizontal. The bobbins 13 in the magazine 14 can thus roll automatically by action of gravity towards the lower end of the magazine. A means serving for automatically transporting the magazine 14 to the loom may be used.

The mechanism for transferring the bobbins 13 individually from the magazine 14 into the chute or channel 11, include a slide 21 which is movable upwardly and downwardly along a rectilinear path defined by guides 23 and 24 (only roughly indicated). Rollers 22, mounted on slide 21, engage guides 23, and guide 24 slidably engages the slide 21. The path of movement of the slide 21 runs parallel to the inclined walls of the magazine 14 which is in the emptying position. The slide 21 and the associated parts still to be described tend to lower by the action of gravity. For moving the slide 21 there is provided an endless, flexible conveying member 25, for instance a link-chain running over two guide wheels 26 and 27, one of which is driven by means of a motor 19 with built-on reduction gear 20. The two sides of the conveying member 25 run parallel to the path of movement of the slide 21. The conveying member 25 has attached thereto a driver cam 28, on which the slide 21 can rest by means of an abutment 29.

The upper end of the slide 21 has rigidly fitted thereon a bracket arm 30, carrying at one end a rod 31 which extends parallel to the path of movement of slide 21 and is provided at its lower end with a gripper for grasping and lifting the bobbins 13. The gripper comprises three parts, namely two feet 32 and 33 intended for resting on the bobbin to be lifted, and also a finger 34 which is capable of gripping under the bobbin to be lifted. The foot 32 is secured to the lower end of rod 31, while the other foot 33 is arranged on a lateral bracket arm 35 of rod 31. The finger 34 is a bent up end portion of a flexible shaft 36 which is rotatably supported in a guide bore of the otherwise hollow rod 31 and extends approximately in the longitudinal direction thereof. The other end portion of shaft 36 projects beyond the upper end of rod 31 and carries a lever 37 which is linked up at 38 to one arm of a bell-crank lever 39. This lever is rockably mounted at its apex by means of a pin 40 on bracket 30. The other arm of lever 39 is connected through a link 41 with a lever 42 which serves as actuating member and is rockably mounted on the abutment 29 of slide 21, so as to enable the driver cam 28 to cooperate besides with

the abutment 29, also with the lever 42 as it moves along one side of the conveying member 25. A spring 43 tends to swing the lever 39 (clockwise in the drawing) until it abuts on a stop 44. Under the influence of spring 43, the finger 34 moves into its operative position, in which it grips under the bobbin 13 to be lifted according to FIG. 1. If, however, the driver cam 28 swings the lever 42 upwards into a position flush with the abutment 29, the finger 34 will take up an inoperative position substantially parallel to the axis of the bobbins 13, as can be recognized from FIG. 2.

The rod 31 and the bracket arm 35 extend parallel and only at a slight distance from one wall of the magazine 14, inclined with respect to the vertical, so that the gripper 32, 33, 34 can be moved from above along said wall into the magazine 14 to its lowest place. The lowermost portion of the axle 36 is somewhat inclined with respect to the longitudinal axis of rod 31, in order to cause the finger 34 in its inoperative position to rest directly on the inner surface of the neighbouring magazine wall.

Above the inlet opening 12 of the channel 11 there extends a horizontal shaft 51 which is journalled in fixed bearings 52 and 53 and carries a lever 54 biased by a spring 55 and resting laterally against the rod 31 by means of a roller 56. The portion of the rod 31 cooperating with the roller 56 serves as a control cam which has, in addition to a rectilinear main portion, a recessed portion 57 at the lower end of rod 31. The shaft 51 has mounted thereon a wing or flap 58 which, with gripper means 32, 33, 34 moved upwards, can swing between rod 31 and foot 33 and thereby grip under the lifted bobbin 13. The side of the wing 58 facing the opening 12 of the channel 11 forms a movable guiding surface for transferring the lifted bobbin to the channel 11. The lever 54 has furthermore connected thereto a mechanical feeler or sensor 59 adapted to protrude into the channel 11 through an aperture 60 in the upper channel boundary. Lever 54 and feeler 59 are connected to the wing 58 through the common swinging shaft 51. Moreover, opposite to the roller 56, the rod 31 is guided by a supporting roller 61 which has for this purpose a peripheral groove and takes the pressure exerted by the lever 54 on the rod 31.

The slide 21 has a stop 65 which, in cooperation with the guide 24, limit the upward movement of the slide.

The channel 11 is a component part of the automatic bobbin-change of a mechanical loom and carries the bobbins 13 in known manner to the hammer at the place of bobbin-change. Advantageously, the longitudinal direction of the channel runs zigzag in a way not shown. Thus the capacity of the channel is enlarged, without there being thus any risk that the bobbins lie obliquely in the channel or even in the longitudinal direction thereof.

The operation of the described mechanism is as follows:

The conveying member 25 is evenly driven by means of the motor 19 and gearing 20 at a comparatively low speed in the sense of the plotted arrows. Let it be now assumed that the component parts of the mechanism are in the position as illustrated in FIG. 1. The two feet 32 and 33 of the gripper 32, 33, 34, rest on a bobbin 13 lying in magazine 14, and the finger 34 grips by action of the spring 43 between the two fingers 32 and 33 under the bobbin in question. The rod 31 keeps the lever 54 contrary to the action of spring 55, in a position, in which the flap 58 is swung out of the path of movement of the gripper 32, 33, 34 or of the bobbin engaged by the same, and in which the feeler 59 grips into the channel 11.

As long as the driver cam 28 moves downwardly along one side of the conveying member 25, nothing happens further; also in the first phase of the upward movement of cam 28 along the other side or run. However, when the cam 28 comes up against the abutment 29 of slide 21, the latter will be pushed upwardly whereby the gripped bobbin 13 is lifted by the gripper 32, 33, 34, until it is somewhat parallel to the inlet opening 12 of channel 11. The stop 65 does not abut on the guide 24 of the slide. In the last phase of this upward movement, the recessed portion 57 of rod 31 comes under the roller 56, and thus the lever 54 is rocked by means of the spring 55. Incidentally the wing or flap 58 swings under the lifted bobbin towards the lower edge of the inlet opening 12, while the feeler 59 is disengaged from channel 11. The stop 65 abuts against guide 34 and as the cam 38 runs around the upper guide wheel 27, it urges the lever 42 upwards against the action of spring 43. Thus the finger 34 is swung substantially through 90 degrees into an inoperative position, and hence the lifted bobbin is released. This falls at first onto the guiding surface of wing 58 and is transferred into the inlet opening 12 of channel 11, in which it rolls until it contacts bobbins possibly already present therein, as illustrated in FIG. 2.

In the downward movement of the driver cam 28, after running round the upper guide wheel 27, the slide 21 follows cam 28 by action of gravity, the rod 31 with the gripper 32, 33, 34 also moves downwardly in the magazine 14. When the recessed portion 57 of rod 31 moves clear of the roller 56, the lever 54, wing 58 and feeler 59 are again swung back into the initial position according to FIG. 1, against the action of spring 55. The gripper moves downwards, until the feet 32 and 33 come to rest on another bobbin lying topmost in the path of movement of the gripper.

Should this bobbin lie obliquely, as shown for example in FIG. 3, it is pressed by the foot 33 into the proper position, or pushed aside, thus permitting the feet 32 and 33 of descending onto the next lower bobbin. The finger 34, still in its inoperative position, has been guided downwardly between said bobbin and the neighbouring magazine wall. The feet 32 and 33 resting on one of the bobbins 13, define the downward movement of the gripper and slide 21. If the driver cam 28 subsequently moves farther downwardly, it moves clear of the abutment 29 and then also of lever 42, thus releasing the latter. Under the force of spring 43, finger 34 now swings again into its operative position, gripping under the bobbin. The mechanism is then again in the initial position shown in FIG. 1, whereupon the described operations repeat automatically and periodically.

Thus the bobbins 13 present in magazine 14 are gripped and lifted by the gripper 32, 33, 34 one after another, and thereupon thrown into the channel 11 of the automatic bobbin-change. The bobbins 13 remaining in the magazine 14, roll from time to time on the slope formed in the magazine towards the front wall thereof, along which the rod 31 is moved. Hence all bobbins are gradually conveyed fully automatically from magazine 14 into the channel 11, inasmuch as also the last bobbin in magazine 14 comes to lie in the path of movement of gripper 32, 33, 34. When the magazine 14 is emptied, it is removed in a way not shown and replaced by a magazine filled with bobbins.

It may happen, and indeed is even preferable, that the subsequent supplying of bobbins 13 from the magazine 14 into the channel 11 takes place more rapidly than the need of bobbins in the loom. Then the case may arise that the row of bobbins in channel 11 extends into the range of feeler or sensor 59, and a bobbin lifted and thrown off by the gripper remains under the free end of feeler 59. When then, at the start of the downward movement of rod 31, the feeler 59 tries to enter into channel 11, it strikes against the underlying bobbin and is hindered in its movement. Thus also the lever 54 cannot swing sufficiently to permit the roller 56 becoming disengaged from the recessed portion 57 of rod 31, thus preventing the latter from further downward movement. Only when, after single or repeated upward drive of the slide 21 by the cam 28 and corresponding lift of the feeler 59, the bobbin under the feeler 59 rolls farther downwards in channel 11, the gripper 32, 33, 34 can again descend

into the magazine 14. As long as the channel 11 is almost completely filled with bobbins, no bobbins are fed from the magazine 14.

Instead of by an electro-motor 19, the conveying members 25 may also be driven from the loom drive through suitable transmission and reduction gear. While in the described form of embodiment the lowering of the rod 31 and slide 21 takes place by action of gravity, this downward movement could also be brought about by the additional power of a spring or by a motor-driven slip-coupling.

Alternatively, instead of a single wing 58 with guiding surface, there may be provided two wings parallel to each other and secured on shaft 51 in spaced relation. Possibly, the gripper could also have only one foot for resting on the bobbin to be lifted and/or two fingers for gripping under the bobbin to be lifted.

The embodiment according to FIG. 4 is a modification of the form according to FIGS. 1 and 2. Corresponding parts in the two forms have corresponding reference numerals. According to FIG. 4, the shaft 51 is lengthened and provided with an additional lever 71. The fixed bearing 52 has further attached thereto a bolt 72 serving as a stop. Another shaft 73 extending parallel to the shaft 51 and bolt 72 is arranged below the inlet opening 12 of channel 11 by means of bearings not visible in FIG. 4. Pivotally secured on the shaft 73 is a two-armed lever 74, one arm of which has a fork-like end portion 75 which, in cooperation with the stop bolt 72, limits the pivotal movement of lever 74 in either direction. The other arm of lever 74 has a hook-shaped head end 76 which, in cooperation with the aforementioned lever 71, serves as latch for locking the lever 71 and the rod 31 in its lifted position.

A lever 77 is supported on the shaft 73 and fitted with a weight lever 78. The lever 77 has mounted thereon a driver bolt 80 intended to cooperate with the two-armed lever 74. Another lever 81 is likewise pivotally secured on shaft 73. One arm of lever 81 has a stop 82 which cooperates with the magazine 14 in the emptying position. The other arm of lever 81 has rockably supported thereon a pawl 83 which cooperates with a side extension 77*a* of lever 77. The same arm of lever 81 also has formed on it a stop 84 which can cooperate with the bolt 72. Moreover, the lever 81 has a weight arm 85. Provided on the bracket arm 35 is a stop 86 which can coact with the pawl 83 when the rod 31 is raised higher than happens at normal operation by the driver cam 28.

The operation of the described mechanism is as follows:

When the magazine 14 is brought to the emptying position it presses the lever 81 by means of the stop 82 against the influence of the weight arm 85 into such a position as to cause the pawl 83 in FIG. 4 to move to the right. Since the pawl 83 has engaged the extension 77*a* of lever 77, the latter is also swung against the influence of its weight arm 78 so as to raise the driver bolt 80 from lever 74. By action of gravity, the lever 74 consequently takes up a position, in which the hook-shaped end 76 is removed from the path of movement of lever 71. The functions for taking bobbins out of the magazine 14 and for transferring the same into the channel 11, as described with reference to FIGS. 1 and 2, can thus take place unimpeded.

If the emptied magazine 14 is taken from the loom, with the rod 31 in its upward raised position, the magazine frees the stop 82, whereupon the lever 81 in FIG. 4 swings counterclockwise under the influence of its weight arm 85, until the stop 84 abuts on bolt 72. Incidentally the pawl 83 moves to the left in FIG. 4, thus enabling the lever 77 to swing counterclockwise under the influence of its weight arm. The driver bolt 80 thereby urges the lever 74 in such a position as to cause the hook-shaped end 76 to engage over the lever 71, thus locking the same against swinging counterclockwise. This locking is extended through shaft 51 onto lever 54 so as to prevent its roller 56 from moving to the right in FIG. 4. The upwardly worked rod 31 is thus held from moving downwards. It is therefore possible again to bring a magazine 14 filled with bobbins to the emptying place on the loom at any desired moment.

If the magazine has to be removed at a time when the rod 31 is not in its highest position and its parts 31–34 are in the magazine, the rod 31 must first be raised out of the magazine, which may be done by hand, at the rod 31 or at the slide 21. This lifting movement can and has to take place so far, until the stop 65 of the slide (cf. FIGS. 1 and 2) strikes against the guide 24. Thus the slide 21 is further raised by an amount which is higher than it can normally be raised by the driver cam 28 at the conveying member 25. Incidentally the stop 86 on the bracket arm 35 comes against the pawl 83, lifting the same, so as to release the extension 77*a* and therewith the lever 77 which, under the influence of the weight lever 78, moves counterclockwise. The lever 74 is also swung by the driver cam 80, until the fork 75 abuts on the stop bolt 72, and the hook-shaped head 76 on lever 74 comes before the lever 71. Thus the latter is held from swinging counterclockwise and the lowering of the slide 21 is prevented as already described, whereupon the magazine 14 may be removed. Removal of the magazine 14 releases the stop 82 so as to permit the lever 81 of pivoting counterclockwise under the influence of the weight arm 85, until the stop 84 abuts on axle 72. Thus the pawl 83 is re-engaged with the extension 77*a* of lever 77.

On bringing a magazine 14 into emptying position, it again swings the lever 81 by means of the stop 82 into the position shown; the lever 77 is also swung clockwise by the pawl 83. The driver bolt 80 moves clear of lever 74 which, however, owing to self-locking of its hook end 76 on lever 71, remains at first in the locking position, because the lever 71 exerts a pressure on the hook end 76 by the weight of rod 31 and the structural parts associated therewith. This prevents, upon attaching a magazine 14, the rod 31 and its associated parts from immediately descending at a great speed. Only when the rod 31 is again somewhat raised by action of the driver cam 28 of the endless conveying member 25 (cf. FIG. 2) can the hook end 76 of lever 74 fall from lever 71, thus releasing the latter. The locking of rod 31 is thus terminated, and it can then again be worked downwards and upwards in accordance with the rotation of the driver cam 28, for the purpose of emptying the bobbins from the magazine 14 as described with reference to FIGS. 1 and 2.

In a form according to FIG. 5, the weft-bobbin 113 has, in contrast to the bobbin 13, a winding reaching up to the thickened head of the bobbin. Arranged on shaft 36 is a finger 134, turned through 180° with respect to the finger 34 of the previous forms. The finger 134 can, by corresponding rotation of axle 36, be brought into an inoperative position substantially parallel to the bobbin axis or be swung under the bobbin 113 to be lifted, as shown in broken lines in FIG. 5. In this case, instead of the supporting foot 32 of the previous forms, there is provided a supporting foot 132 somewhat different in shape, which shall also rest on the head of the bobbin to be lifted. In order that the finger 134 can be pushed better through between the bobbin 113 and the front wall of the magazine 114, a recess 115 is provided on the inner surface of the magazine wall. As to the rest, the mechanism may in design be identical with the preceding forms of embodiments.

The form according to FIGS. 6–8 differs from the previously described embodiments principally in that, instead of a finger 34 or 134 pivotal into operative and inoperative positions, there is provided a flap 200 hingedly mounted on a plate 202 by means of a horizontal pivot shaft 201. The plate 202 is fixed, for instance,

to a bracket arm 35 (FIG. 1). A spring 203 tends to swing the flap 200 away from the plate, until a pair of stops 204 and 205 on the flap or plate respectively abut on each other. Above the flap 200, the bracket arm 35 has moreover arranged thereon a supporting foot 232 which can rest on the bobbin 13 to be lifted. The flap 200 and the foot 232 together constitute a gripper for lifting the bobbin 13. The magazine 14 has in its bottom an opening 206, into which the flap 200 and the lower end portion of plate 202 can enter for engaging a bobbin 13 lying directly on the bottom of the magazine. At the channel 11, and in fact above the inlet opening 12, preferably two strippers 207 are arranged in spaced relation, which project with inclined faces 208 into the path of movement of the upwardly moved bobbin.

The operation of the described mechanism is as follows:

As the gripper 200, 232 moves downwardly the lower end portion of plate 202 with the flap 200 slides downwards between the front wall of magazine 14 and the bobbin 13 lying topmost in the path of movement of the gripper, whereby the flap is swung automatically toward the plate 202 against the action of spring 203. The downward movement is limited by the foot 232 resting on the bobbin to be lifted. Beneath the topmost bobbin, the flap 200 can swing off the plate 202 by the action of spring 203 and thus grip under the bobbin to be lifted, in as far as the other bobbins in magazine 14 permit. In the upward movement of gripper 200, 232, the flap 200, by the action of spring 203, then moves completely under the bobbin 13 to be lifted, which is then carried upwards by the flap 200, since the latter is hindered by the stops 204 and 205 from swivelling further downwards. When the bobbin 13 engaged by the gripper has been lifted over the inlet opening 12 of channel 11, it comes against the inclined faces 208 of the strippers 207, whereby the bobbin 13 is thrown off the flap 200 and then transferred into the channel 11 by means of the wing 58, as described in detail hereinbefore with reference to FIGS. 1 and 2.

FIGS. 9 and 10 illustrate a modified form of embodiment. The upwardly and downwardly movable rod 31 (not shown) has fixed thereto a supporting foot 132 intended to rest on the thickened head of a bobbin 13 to be lifted to thus limit the downward movement of rod 31. The supporting foot 132 has pivoted thereto two clamping members 300 by means of pins 301. The clamping members 300 are two-armed levers. The downwardly pointing arms of the clamping members have jaws adapted to grip the neck of the bobbin 13 to be lifted. Inserted between the upwardly pointing arms of the clamping members 300 is a compression spring 302 which tends to swivel the clamping members so as to firmly hold the bobbin 13 to be lifted. The supporting foot 132 and the clamping device 300—302 together constitute the gripper for engaging and lifting the bobbins. Above the inlet opening (not shown in FIGS. 9 and 10) of the channel 11 (FIG. 1) there is a stripper 307 which, similar to the strippers 207 according to FIG. 7, projects into the path of movement of the bobbin being lifted and thus presses the upwardly moving bobbin out of the clamping members 300. The bobbin thus freed is transferred into the channel 11 by means of the wing 58 in a way similar to that described with reference to FIGS. 1 and 2.

FIG. 11 shows a form of embodiment, in which the gripper for engaging and lifting the bobbins 113 which are fitted at their head with iron rings 113*a*, has a permanent magnetic portion 400 serving for lifting the bobbins, and a non-magnetic portion 401 which merely acts as a supporting foot, similar to the feet 32 and 132 in the preceding forms. Above the inlet opening (not shown in FIG. 11) of the channel 11 (FIG. 1) there is also a stripper 407 projecting into the path of movement of the upwardly moving bobbin 113 and adapted to free the lifted bobbin from the magnetic portion 400 so that the bobbin is subsequently transferred by means of the wing 58 into the channel 11, as described with reference to FIGS. 1 and 2.

In a given case, instead of the permanent-magnetic portion 400 there may be provided one with electromagnetic action.

In the embodiments according to FIGS. 6–11 no pivotal finger 34 or 134 is provided, so that the parts 36—44 according to FIG. 1 can be dispensed with.

In a given case it is advantageous to have the various aforedescribed forms of gripper combined with each other, for instance in such a way that there are provided both a magnetically acting part and a finger gripping under the bobbin, or a clamping device adapted to engage at a time the thickened bobbin head or the preceding neck and the bobbin tip. Thereby the supporting feet may likewise coact with the ends of the bobbin or with the middle section thereof, a single supporting foot being sufficient in the latter case.

The gripper need not in any case be movable along the front wall of the bobbin magazine. If, for instance, the bottom of the magazine has in its middle section a trough-like recess forming the lowest place thereof, when the magazine is in its emptying position, the gripper must be movably guided upwards and downwards over the trough-shaped middle section of the bottom, in order that it can in every case remove from the magazine the last bobbin which rolls to the lowest place thereof. When taking the bobbins from the magazine, on both sides of the path of movement of the gripper the bobbins form two slopes over which the bobbins roll from time to time into the path of movement of the gripper.

What we claim is:

1. In combination with a loom having an automatic weft bobbin changer and a chute for delivering weft bobbins to said bobbin changer, said chute having an opening for receiving weft bobbins therein, the improvement which comprises, at least one bobbin container for receiving the bobbins therein arranged with their longitudinal axes disposed substantially horizontally, said container having an open top positionable below said opening in a position in which the container bottom is downwardly inclined toward said chute, mechanism for automatically removing the bobbins individually into said chute through said opening comprising, gripper means for gripping individual bobbins and lifting them to said opening, means for reciprocably guiding said gripper means into said container and out of said container along a given path, continuously driven means for cyclically lifting said gripper means automatically to the level of said opening and lowering said gripper means into said container under the effect of gravity, means for causing said gripper means to stop its movement downwardly along said given path and to select an individual bobbin in said path for removal from said container, means automatically activated by said driven means for rendering said gripper means effective to grasp said bobbin selected when said gripper stops moving downwardly, means rendered effective automatically by said driven means for rendering said gripper means ineffective when a bobbin is lifted parallel to said chute opening and to release the individual bobbins, and means to deliver the bobbins individually released by the gripper means into said chute opening.

2. In a combination according to claim 1, in which said gripper means comprises a flexible shaft having a hooked end operable to an ineffective position with said hooked end parallel to the axis of the individual bobbins and in which said means for rendering said gripper means effective comprises means for positioning said hooked end substantially normal to the longitudinal axis of the individual bobbins, and said means for rendering said gripper means ineffective comprises means for positioning said hooked end of said shaft substantially parallel to the axis of the individual bobbins.

3. In combination with a loom having an automatic

weft bobbin changer and a chute for delivering weft bobbins to said bobbin changer, said chute having an opening for receiving weft bobbins therein, the improvement which comprises, at least one bobbin container for receiving the bobbins therein arranged with their longitudinal axes disposed substantially horizontally, said container having an open top positionable below said opening in a position in which the container bottom is downwardly inclined toward said chute, mechanism for automatically removing the bobbins individually into said chute through said opening comprising, gripper means for gripping individual bobbins and lifting them to said opening, means for reciprocably guiding said gripper means into said container and out of said container along a given path, continuously driven means for lifting said gripper means automatically to the level of said opening and lowering said gripper means into said container under the effect of gravity, means for causing said gripper means to stop its movement downwardly along said given path and to select an individual bobbin in said path for removal from said container, means automatically activated by said driven means for rendering said gripper means effective to grasp said bobbin selected when said gripper stops moving downwardly, means rendered effective automatically by said driven means for rendering said gripper means ineffective when a bobbin is lifted parallel to said chute opening and to release the individual bobbins, means to deliver the bobbins individually released by the gripper means into said chute opening, and sensing means to inactivate said mechanism when said chute is substantially filled with bobbins and to activate said mechanism when said chute is sufficiently emptied to receive more bobbins.

4. In combination with a loom having an automatic weft bobbin changer and a chute for delivering weft bobbins to said bobbin changer, said chute having an opening for receiving weft bobbins therein, the improvement which comprises, at least one bobbin container for receiving the bobbins therein arranged with their longitudinal axes disposed substantially horizontally, said container having an open top positionable below said opening in a position in which the container bottom is downwardly inclined toward said chute, mechanism for automatically removing the bobbins individually into said chute through said opening comprising, gripper means for gripping individual bobbins and lifting them to said opening, means for reciprocably guiding said gripper means into said container and out of said container along a given path, continuously driven means for cyclically lifting said gripper means automatically to the level of said opening and lowering said gripper means into said container under the effect of gravity, means for causing said gripper means to stop its movement downwardly along said given path and to select an individual bobbin in said path for removal from said container, means automatically activated by said driven means for rendering said gripper means ineffective when a bobbin is lifted parallel to said chute opening and to release the individual bobbins, means to receive the bobbins individually released by said gripper means parallel to said opening operable to deliver the bobbins individually released by the gripper means into said chute opening, and sensing means to inactivate said mechanism when said chute is substantially filled with bobbins and to activate said mechanism when said chute is sufficiently emptied to receive more bobbins.

5. In a combination according to claim 4, in which

said means to deliver the bobbins released by said gripper means individually to said chute opening comprises a pivotally mounted flap having a bent lower portion to receive the bobbins individually in said bent portion extending longitudinally therein, and means to cyclically activate said flap into an operative position for receiving said bobbins and subsequently delivering them into said chute opening and for restoring said flap to a rest position, the last mentioned means comprising means to cyclically actuate said flap in timed relationship with the up and down movement of said gripper means.

6. In combination with a loom having an automatic weft bobbin changer and a chute for delivering weft bobbins to said bobbin changer, said chute having an opening for receiving weft bobbins therein, the improvement which comprises, at least one bobbin container for receiving the bobbins therein arranged with their longitudinal axes disposed substantially horizontally, said container having an open top positionable below said opening in a position in which the container bottom is downwardly inclined toward said chute, mechanism for automatically removing the bobbins individually into said chute through said opening comprising, gripper means for gripping individual bobbins and lifting them to said opening, means for reciprocably guiding said gripper means into said container and out of said container along a given path, continuously driven means for cyclically lifting said gripper means automatically to the level of said opening and lowering said gripper means into said container under the effect of gravity, means for causing said gripper means to stop its movement downwardly along said given path and to select an individual bobbin in said path for removal from said container, means automatically activated by said driven means for rendering said gripper means effective to grasp said bobbin selected when said gripper stops moving downwardly, means rendered effective automatically by said driven means for rendering said gripper means ineffective when a bobbin is lifted parallel to said chute opening and to release the individual bobbins, means to deliver the bobbins individually released by the gripper means into said chute opening, latch means for latching said mechanism with said gripper means in a raised condition, and said latch means comprising means for rendering it effective when said container is removed from said position and for rendering it ineffective when said container is disposed in said position for unloading.

References Cited in the file of this patent

UNITED STATES PATENTS

762,895	Filley	June 21, 1904
775,071	Townsend	Nov. 15, 1904
787,623	Hood	Apr. 18, 1905
884,589	Jenkins	Apr. 14, 1908
1,030,180	Hillyer	June 18, 1912
1,041,304	Koechlin	Oct. 15, 1912
1,134,669	Chiniquy et al.	Apr. 6, 1915
1,530,347	Glais	Mar. 17, 1925
1,650,278	Kingsbury et al.	Nov. 22, 1927
2,070,165	Griffith	Feb. 9, 1937
2,076,116	Brinton	Apr. 6, 1937
2,289,325	Harris	July 7, 1942
2,628,726	Van Schie	Feb. 17, 1953
2,652,934	Van Schie	Sept. 22, 1953

FOREIGN PATENTS

167,987	Sweden	Aug. 4, 1959